Lab 11: Urinary System Anatomy and Physiology, Reproductive System Anatomy

Unit 15: Urinary System
Unit 16: Reproductive Systems
Cat Dissection: Photo Atlas, Chapter 19

Ex. 15-1: Urinary System Anatomy, p. 385-391
Ex. 16-1: Male Reproductive Anatomy, p. 409-411
Ex. 16-2: Female Reproductive Anatomy, p. 412-414
Cat Dissection: Photo Atlas, Ch. 19 (p. 182-184)

KIDNEY

Locate the following structures on the sheep kidney and human kidney models:

Sheep Kidney          Kidney Models          Nephron Model
renal capsule         renal artery and vein    nephron
 cortex               adipose capsule         glomerular capsule
 medulla              cortex               (Bowman’s capsule)
pelvis                medulla              convoluted tubules
 ureter               hilum                PCT
 pyramids             pyramids             DCT

UROGENITAL SYSTEM

Locate the following structures on the cat and on models and charts of the human:

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidneys (right &amp; left)</td>
<td>Ureters</td>
</tr>
<tr>
<td>Adrenal glands</td>
<td>Urinary bladder</td>
</tr>
<tr>
<td>Renal arteries</td>
<td>Urethra</td>
</tr>
<tr>
<td>Renal veins</td>
<td></td>
</tr>
<tr>
<td>Ovaries</td>
<td>Scrotum</td>
</tr>
<tr>
<td>Uterine tube</td>
<td>Testes</td>
</tr>
<tr>
<td>Uterus</td>
<td>Epididymis</td>
</tr>
<tr>
<td>*Uterine horns</td>
<td>Vas deferens</td>
</tr>
<tr>
<td>Uterine body</td>
<td>Spermatic cord</td>
</tr>
<tr>
<td>Cervix</td>
<td>Inguinal canal</td>
</tr>
<tr>
<td>Vagina</td>
<td>Urethra</td>
</tr>
<tr>
<td>Broad Ligament</td>
<td>Prostate gland</td>
</tr>
<tr>
<td>*Urogenital sinus</td>
<td>Penis</td>
</tr>
<tr>
<td>Vulva</td>
<td></td>
</tr>
</tbody>
</table>

*Found in cat only, not in the human.
Urinalysis

I. Terminology

<table>
<thead>
<tr>
<th>Urochrome</th>
<th>Hematuria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucosuria</td>
<td>Crystals</td>
</tr>
<tr>
<td>Ketonuria</td>
<td>Casts</td>
</tr>
<tr>
<td>Pyuria</td>
<td>Renal Calculi</td>
</tr>
</tbody>
</table>

II. Analysis of Unknowns (“fake” urine)

A. **Appearance** – check color and transparency
   - Normal color: ________________
   - Urochrome
   - Abnormal colors:
     - Reddish amber – urobilinogen (produced by action of intestinal bacteria on bile pigment)
     - Red to smoky brown: blood and blood pigments
   - Normal transparency: ________________
   - Abnormal transparency:
     - Cloudy – bacterial infection, pus, fat

B. **Specific Gravity** – use urinometer [read at meniscus to 3 decimal places]
   - Normal range: 1.003 to 1.030
   - Abnormal: low – chronic nephritis, diabetes insipidus
                high – diabetes mellitus, acute nephritis

C. **Multistix (urine test strips)** – know what is considered normal for each test and know one abnormal situation for each urine component.

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ketones:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. **Sediments** - examine sediment slide. You are responsible for naming 2 sediments, not for identifying them on the slide.
Urinalysis Questions:

1. What is a typical volume of urine that would be excreted in a day?

2. What substance is responsible for the normal “yellow” color of urine?

3. Which has a greater specific gravity: 1 ml of dH₂O or 1 ml of urine?
   Why?

4. Glucosuria is indicative of what clinical situation?

Urogenital System Questions:

1. Name the following structures:
   a. Cup-shaped structure that surrounds the glomerulus:
   b. Cone-shaped areas in the medulla of the kidney:
   c. Fibrous outer covering of kidney:
   d. Functional unit of kidney:
   e. Tubes that drain the kidneys:

2. Describe the function:
   a. Vas deferens:
   b. Prostate gland:
   c. Uterine tubes:
   d. Uterine horns:
Lab 12: Respiratory Anatomy & Physiology
Unit 13: Respiratory System
Cat Dissection: Photo Atlas

Locate these structures on the models and chart for the human:
*Locate these * structures on the cat.*

Diaphragm          *Larynx
Pleura             *Vocal Cords
Visceral           *Epiglottis
Parietal           *Glottis
Pleural Cavity     Thyroid Cartilage
*Lungs             Cricoid Cartilage
Lobes              *Tracheal Cartilage
Mediastinum        Primary Bronchi
*Phrenic Nerves    Secondary Bronchi

Respiratory Physiology:
Define these lung volumes and know the number of milliliters for each:

Tidal Volume
Inspiratory Reserve Volume
Expiratory Reserve Volume
Vital Capacity
Residual Volume
Bell Jar Model:

Identify the parts of the Bell Jar Model that represent the following:

A. lungs -
B. pleural cavity -
C. diaphragm -
D. thoracic cavity wall -

Respiratory Slides:

Normal lung
Emphysema
Pneumonia

Respiratory System Questions:

1. How does the number of lung lobes in the human compare to the cat?
   Human: _______   Cat: _______

2. The trachea bifurcates into two primary _________________.

3. The cartilaginous flap that deflects food and liquid into the esophagus and away from the respiratory tree is the _________________.

4. The phrenic nerve innervates the ________________.

5. How many pleural cavities are there? ________________.

6. What pressure change occurs in the Bell Jar when the “diaphragm” is pulled down _________________.

7. What pressure change occurs in the Bell Jar when the “diaphragm” is released ________________.
Lung Volumes:

Label the following lung volumes and capacities:

- TLC
- TV
- IRV
- ERV
- RV
- VC

![Diagram of lung volumes and capacities]
Identify the following structures on the Respiratory System diagram:

<table>
<thead>
<tr>
<th>Alveoli</th>
<th>Epiglottis</th>
<th>Tertiary bronchi and bronchioles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apex</td>
<td>Esophagus</td>
<td>Visceral pleura</td>
</tr>
<tr>
<td>Base</td>
<td>Trachea</td>
<td>Pleural cavity</td>
</tr>
<tr>
<td>Diaphragm (contracted)</td>
<td>Primary bronchus</td>
<td>Parietal pleura</td>
</tr>
<tr>
<td>Diaphragm (relaxed)</td>
<td>Secondary bronchus</td>
<td>Larynx</td>
</tr>
</tbody>
</table>
Bio 104: Computer Exercise - Anatomy & Physiology Revealed (APR)

**Urinary, Reproductive, & Respiratory Systems**

A. See Lab Instructor to sign logbook for use of laptop and CD in the lab room.
B. Insert Anatomy & Physiology Revealed (APR) cd into cd drive and allow it to autoplay.
C. Select System → **Urinary**. Select **Dissection** (scalpel icon) → Select Topic → **Upper Urinary**. Select View → **Anterior**. Click the green **Go** button.

Click on **Layer 4** and identify the following structures:
4. Kidney
5. Ureter
6. Renal vein
7. Renal artery
8. Adrenal gland (suprarenal gland)

Select **Change Topic/View** → Select **Kidney**. Select View → **Anterior**. Click the green **GO** button.

Click on **Layer 2** and identify the following structures:
1. Renal cortex
2. Renal medulla
3. Minor calyx
4. Major calyx
5. Renal pelvis

**Question:**
1. Trace the flow of urine from the minor calyx to the outside of the body.

Select System → **Reproductive** → Select **Change Topic/View** → Select **Pelvis-Female**. Select View → **Sagittal**. Click the green **GO** button.

Click on **Layer 1** and identify the following structures:
1. Ovary
2. Uterine tube
3. Uterus
4. Cervix
5. Vagina
6. Urinary Bladder
7. Urethra

Questions:
1. What is another name for “uterine tube”?

2. What is the superior rounded portion of the uterus called?

3. Describe the major differences observed between the female cat and the human regarding the urinary and reproductive systems.

Select Change Topic/View→Select Pelvis-Male. Select View → Sagittal. Click the green GO button.

Click on Layer 1 and identify the following structures:
1. Scrotum
2. Testis
3. Epididymis
4. Urinary bladder
5. Prostate gland
6. Urethra (Prostatic, Membranous, Penile)
7. Penis

Select Change Topic/View→Select Testis and Spermatic Cord (isolated). Select View → Lateral. Click the green GO button.

Click on Layer 3 and identify the following structures:
1. Testis
2. Epididymis
3. Vas Deferens
Questions:
1. Identify the specific location of spermatogenesis.

Select **System → Respiratory → Select Change Topic/View → Select Larynx.** Select **View → Anterior.** Click the green GO button.

Click on **Layer 2** and identify the following structures:
1. Epiglottis
2. Hyoid bone
3. Thyroid cartilage
4. Cricoid cartilage
5. Trachea
6. Tracheal cartilage

Select **Change Topic/View → Select Lower Respiratory.** Select **View → Anterior.** Click the green GO button.

Click on **Layer 4** and identify the following structures:
1. Trachea
2. Primary bronchus (left & right Main Bronchus)
3. The lobes of the lung
4. Diaphragm

**Question:** For the human lungs, identify the number of lobes and their names.

Select the **Animations Icon.** From the animations list, select **Thoracic Cavity Dimensional Changes.** Click Play.

**Questions:**
1. What happens to the thoracic cavity volume during inspiration?

2. During diaphragm contraction, does the volume of the thoracic cavity increase or decrease?
From the animations list, select **Alveolar Pressure Changes**. Click **Play**.

**Questions:**

1. During expiration, what causes air to flow out of the lungs?

From the animations list, select **Partial Pressure**. Click **Play**.